

SEQUENCE LISTING

<110> Watkins, Jeffry D.
Huse, William D.
Tang, Ying

<120> Humanized Collagen Antibodies and
Related Methods

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15

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Glu Lys Val Thr Met Ser Cys Lys Ser Ser Gln Ser Leu Leu Asn Ser

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25

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gga aat caa aag aac tac ttg gcc tgg tac cag cag aaa cca ggg cag 144
Gly Asn Gln Lys Asn Tyr Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln

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cct cct aaa ctg ttg atc tat ggg gca tcc act agg gaa tct ggg gtc 192
Pro Pro Lys Leu Leu Ile Tyr Gly Ala Ser Thr Arg Glu Ser Gly Val

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cct gat cgc ttc aca ggc agt gga tct gga acc gat ttc act ctt atc 240
Pro Asp Arg Phe Thr Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Ile

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70

75

80

atc agc agt gtg cag gct gaa gac ctg gca gtt tat tac tgt cag aat 288
Ile Ser Ser Val Gln Ala Glu Asp Leu Ala Val Tyr Tyr Cys Gln Asn

85

90

95

gat cat agt tat ccg tac acg ttc gga ggg ggg acc aag ctg gaa ata 336
Asp His Ser Tyr Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile

100

105

110

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Lys

339

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Ser	Leu	Lys	Leu	Ser	Cys	Ala	Ala	Ser	Gly	Phe	Asp	Phe	Ser	Arg	Tyr	
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Trp	Met	Ser	Trp	Val	Arg	Gln	Ala	Pro	Gly	Lys	Gly	Leu	Glu	Trp	Ile	
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gga	gaa	att	aat	cca	gat	agc	agt	acg	ata	aac	tat	acg	cca	tct	cta	192
Gly	Glu	Ile	Asn	Pro	Asp	Ser	Ser	Thr	Ile	Asn	Tyr	Thr	Pro	Ser	Leu	
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Lys	Asp	Lys	Phe	Ile	Ile	Ser	Arg	Asp	Asn	Ala	Lys	Asn	Thr	Leu	Tyr	
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 85 90 95

gca aga ccg gtt gat ggt tac tac gat gct atg gac tac tgg ggt caa 336
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 35 40 45
 Gly Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Ser Leu
 50 55 60
 Lys Asp Lys Phe Ile Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Tyr
 65 70 75 80
 Leu Gln Met Ser Lys Val Arg Ser Glu Asp Thr Ala Leu Tyr Tyr Cys
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 tcc aac aat aag aac tac tta gct tgg tac cag cag aaa cca gga cag 144
 cct cct aag ctg ctg att tac tgg gca tct acc cgg gaa tcc ggg gtc 192
 cct gac cga ttc agt ggc agc ggg tct ggg aca gat ttc act ctg acc 240
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35 40 45
Pro Pro Lys Leu Leu Ile Tyr Trp Ala Ser Thr Arg Glu Ser Gly Val
50 55 60
Pro Asp Arg Phe Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr
65 70 75 80
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100 105 110
Lys

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tgg atg agc tgg gtc cgc cag gct cca ggg aag ggg ctg gag tgg gtg 144
gcc aac ata aag caa gat gga agt gag aaa tac tat gtg gac tct gtg 192
aag ggc cga ttc acc atc tcc aga gac aac gcc aag aac tca ctg tat 240
ctg caa atg aac agc ctg aga gcc gag gac acg gct gtg tat tac tgt 288
gcg aga 294

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<212> PRT

<213> Homo sapiens

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35 40 45
Ala Asn Ile Lys Gln Asp Gly Ser Glu Lys Tyr Tyr Val Asp Ser Val
50 55 60
Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65 70 75 80
Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
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100 105 110

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 gat caa gcc tcc atc tct tgc aga tct agt cag agc att gta cat agt 96
 Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
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 aat gga aac acc tat tta gaa tgg tac ctg cag aaa cca ggc cag tct 144
 Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
 35 40 45
 cca aag ctc ctg atc tac aaa gtt tcc aac cga ttt tct ggt gtc cca 192
 Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
 50 55 60
 gac agg ttc agt ggc agt gga tca ggg aca gat ttc aca ctc aag atc 240
 Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
 65 70 75 80
 agc aga gtg gag gct gag gat ctg gga gtt tat tac tgc ttt caa ggt 288
 Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
 85 90 95
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 20 25 30
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Asp	Arg	Phe	Ser	Gly	Ser	Gly	Ser	Gly	Thr	Asp	Phe	Thr	Leu	Lys	Ile
65					70					75				80	
Ser	Arg	Val	Glu	Ala	Glu	Asp	Leu	Gly	Val	Tyr	Tyr	Cys	Phe	Gln	Gly
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1			5				10					15				

acc	ctc	agt	ctg	act	tgt	tct	ttc	tct	ggg	ttt	tca	ctg	agc	act	tct	96
Thr	Leu	Ser	Leu	Thr	Cys	Ser	Phe	Ser	Gly	Phe	Ser	Leu	Ser	Thr	Ser	
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ggc	atg	ggc	gta	ggc	tgg	att	cgt	cag	cct	tca	gga	gag	ggc	cta	gag	144
Gly	Met	Gly	Val	Gly	Trp	Ile	Arg	Gln	Pro	Ser	Gly	Glu	Gly	Leu	Glu	
	35				40						45					

tgg	ctg	gca	gac	att	tgg	tgg	gat	gac	aat	aag	tac	tat	aac	cca	tcc	192
Trp	Leu	Ala	Asp	Ile	Trp	Trp	Asp	Asp	Asn	Lys	Tyr	Tyr	Asn	Pro	Ser	
	50				55					60						

ctg	aag	agc	cgg	ctc	aca	atc	tcc	aag	gat	acc	tcc	agc	aac	cag	gta	240
Leu	Lys	Ser	Arg	Leu	Thr	Ile	Ser	Lys	Asp	Thr	Ser	Ser	Asn	Gln	Val	
	65			70				75						80		

ttc	ctc	aag	atc	acc	agt	gtg	gac	act	gca	gat	act	gcc	act	tac	tac	288
Phe	Leu	Lys	Ile	Thr	Ser	Val	Asp	Thr	Ala	Asp	Thr	Ala	Thr	Tyr	Tyr	
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tgt	gct	cga	aga	gct	aac	tat	ggc	aac	ccc	tac	tat	gct	atg	gac	tac	336
Cys	Ala	Arg	Arg	Ala	Asn	Tyr	Gly	Asn	Pro	Tyr	Tyr	Ala	Met	Asp	Tyr	
	100				105							110				

tgg	ggc	caa	gga	acc	tca	gtc	acc	gtc	tcc	tca						369
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Gly	Met	Gly	Val	Gly	Trp	Ile	Arg	Gln	Pro	Ser	Gly	Glu	Gly	Leu	Glu
		35					40					45			
Trp	Leu	Ala	Asp	Ile	Trp	Trp	Asp	Asp	Asn	Lys	Tyr	Tyr	Asn	Pro	Ser
	50					55					60				
Leu	Lys	Ser	Arg	Leu	Thr	Ile	Ser	Lys	Asp	Thr	Ser	Ser	Asn	Gln	Val
65					70					75					80
Phe	Leu	Lys	Ile	Thr	Ser	Val	Asp	Thr	Ala	Asp	Thr	Ala	Thr	Tyr	Tyr
				85					90					95	
Cys	Ala	Arg	Arg	Ala	Asn	Tyr	Gly	Asn	Pro	Tyr	Tyr	Ala	Met	Asp	Tyr
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Trp	Gly	Gln	Gly	Thr	Ser	Val	Thr	Val	Ser	Ser					
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gat	gat	gga	aac	acc	tat	ttg	gac	tgg	tac	ctg	cag	aag	cca	ggg	cag	144
tct	cca	cag	ctc	ctg	atc	tat	acg	ctt	tcc	tat	cgg	gcc	tct	gga	gtc	192
cca	gac	agg	ttc	agt	ggc	agt	ggg	tca	ggc	act	gat	ttc	aca	ctg	aaa	240
atc	agc	agg	gtg	gag	gct	gag	gat	gtt	gga	gtt	tat	tac	tgc	atg	caa	288
cgt	ata	gag	ttt	cct	tc											305

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			20					25					30		
Asp	Gly	Asn	Thr	Tyr	Leu	Asp	Trp	Tyr	Leu	Gln	Lys	Pro	Gly	Gln	Ser
		35					40						45		
Pro	Gln	Leu	Leu	Ile	Tyr	Thr	Leu	Ser	Tyr	Arg	Ala	Ser	Gly	Val	Pro
	50					55					60				
Asp	Arg	Phe	Ser	Gly	Ser	Gly	Ser	Gly	Thr	Asp	Phe	Thr	Leu	Lys	Ile
65					70					75					80
Ser	Arg	Val	Glu	Ala	Glu	Asp	Val	Gly	Val	Tyr	Tyr	Cys	Met	Gln	Ser
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His Val Pro Trp Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
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<210> 15
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 cagccccag ggaaggccct ggagtggctt gcacgcattg attggg atg atg ata 175
 aat tct aca gca cat ctc tga agaccaggct caccatctcc aaggacacct 226
 ccaaaaacca ggtggtcctt acaatgacca acatggaccc tgtggacaca gccacgtatt 286
 ac 288

<210> 16
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 <213> Homo sapiens

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 35 40 45
 Trp Leu Ala Arg Ile Asp Trp Asp Asp Asp Lys Phe Tyr Ser Thr Ser
 50 55 60
 Leu Lys Thr Arg Leu Thr Ile Ser Lys Asp Thr Ser Lys Asn Gln Val
 65 70 75 80
 Val Leu Thr Met Thr Asn Met Asp Pro Val Asp Thr Ala Thr Tyr Tyr
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 Cys Ala Arg Arg Ala Asn Tyr Tyr Tyr Tyr Tyr Tyr Ala Met Asp Val
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 Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
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Glu	Pro	Ala	Ser	Ile	Ser	Cys	Arg	Ser	Ser	Gln	Ser	Leu	Leu	Asp	Ser	
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gat	gat	gga	aac	acc	tat	ttg	gac	tgg	tac	ctg	cag	aag	cca	ggg	cag	144
Asp	Asp	Gly	Asn	Thr	Tyr	Leu	Asp	Trp	Tyr	Leu	Gln	Lys	Pro	Gly	Gln	
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Pro	Asp	Arg	Phe	Ser	Gly	Ser	Gly	Ser	Gly	Thr	Asp	Phe	Thr	Leu	Lys	
		65			70					75					80	
atc	agc	agg	gtg	gag	gct	gag	gat	gtt	gga	gtt	tat	tac	tgc	atg	caa	288
Ile	Ser	Arg	Val	Glu	Ala	Glu	Asp	Val	Gly	Val	Tyr	Tyr	Cys	Met	Gln	
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cgg	ttc	aca	tgt	tcc	gtg	gac	gtt	cgg	cca	agg	gac	caa	ggg	gga	aat	336
Arg	Phe	Thr	Cys	Ser	Val	Asp	Val	Arg	Pro	Arg	Asp	Gln	Gly	Gly	Asn	
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Gln																

<210> 18
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 35 40 45
 Ser Pro Gln Leu Leu Ile Tyr Thr Leu Ser Tyr Arg Ala Ser Gly Val
 50 55 60
 Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys
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 Gln

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gcc 51
Ala

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1 5 10 15
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<210> 21
<211> 21
<212> DNA
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<220>
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<222> (1)...(21)

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Gly Ala Ser Thr Arg Glu Ser
1 5

<210> 22
<211> 7
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<400> 22
Gly Ala Ser Thr Arg Glu Ser
1 5

<210> 23

<211> 27
<212> DNA
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<220>
<221> CDS
<222> (1)...(27)

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Gln Asn Asp His Ser Tyr Pro Tyr Thr
1 5

27

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<400> 24
Gln Asn Asp His Ser Tyr Pro Tyr Thr
1 5

<210> 25
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<220>
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<222> (1)...(30)

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Gly Phe Asp Phe Ser Arg Tyr Trp Met Ser
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30

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<400> 26
Gly Phe Asp Phe Ser Arg Tyr Trp Met Ser
1 5 10

<210> 27
<211> 51
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<220>

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<222> (1)...(51)

<400> 27

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gat 51
Asp

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<400> 28

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Ser Leu Lys
1 5 10 15
Asp

<210> 29
<211> 33
<212> DNA
<213> Mus musculus

<220>
<221> CDS
<222> (1)...(33)

<400> 29

ccg gtt gat ggt tac tac gat gct atg gac tac 33
Pro Val Asp Gly Tyr Tyr Asp Ala Met Asp Tyr
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<210> 30
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<400> 30

Pro Val Asp Gly Tyr Tyr Asp Ala Met Asp Tyr
1 5 10

<210> 31
<211> 48
<212> DNA
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<221> CDS
<222> (1)...(48)

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1 5 10 15

<210> 32
<211> 16
<212> PRT
<213> Mus musculus

<400> 32
Arg Ser Ser Gln Ser Ile Val His Ser Asn Gly Asn Thr Tyr Leu Glu
1 5 10 15

<210> 33
<211> 21
<212> DNA
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<220>
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<222> (1)...(21)

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Lys Val Ser Asn Arg Phe Ser
1 5

<210> 34
<211> 7
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<213> Mus musculus

<400> 34
Lys Val Ser Asn Arg Phe Ser
1 5

<210> 35
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<212> DNA
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<220>
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<222> (1)...(27)

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Phe Gln Gly Ser His Val Pro Trp Thr
1 5

27

<210> 36

<211> 9

<212> PRT

<213> Mus musculus

<400> 36

Phe Gln Gly Ser His Val Pro Trp Thr
1 5

<210> 37

<211> 36

<212> DNA

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<220>

<221> CDS

<222> (1)...(36)

<400> 37

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36

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<212> PRT

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<400> 38

Gly Phe Ser Leu Ser Thr Ser Gly Met Gly Val Gly
1 5 10

<210> 39

<211> 48

<212> DNA

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<220>

<221> CDS

<222> (1)...(48)

<400> 39

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Asp Ile Trp Trp Asp Asp Asn Lys Tyr Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

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<220>
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<222> (1)...(39)

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<210> 42
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<210> 43
<211> 10
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Gly Phe Asp Phe Ser His Tyr Trp Met Ser
1 5 10

<210> 44
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<400> 45

Gly Phe Asp Phe Ser Arg Tyr Trp Met Thr
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<400> 46

Gly Phe Asp Phe Ser Arg Tyr Trp Met Ala
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<400> 47

Gly Phe Asp Phe Ser Arg Tyr Trp Met Gly
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<400> 48

Glu Ile Asn Pro Asp Ser Ser Thr Ala Asn Tyr Thr Pro Ser Leu Lys
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<211> 17

<212> PRT

<213> Artificial Sequence

<220>

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<400> 49

Glu Ile Asn Pro Asp Ser Ser Thr Ser Asn Tyr Thr Pro Ser Leu Asp
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<210> 50

<211> 17

<212> PRT

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<220>

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<400> 50

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Tyr Leu Lys
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<210> 51

<211> 17

<212> PRT

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<220>

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<400> 51

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Ala Leu Lys
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<210> 52

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

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<400> 52

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro His Leu Lys
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Asp

<210> 53

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

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<400> 53

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Gly Leu Lys
1 5 10 15
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<210> 54

<211> 17

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<220>

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<400> 54

Glu Ile Asn Pro Asp Ser Ser Thr Ile Asn Tyr Thr Pro Ser Leu Gln
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<210> 55

<211> 17

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<220>

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<400> 55

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<210> 57
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<400> 57
Pro Val Gly Gly Tyr Tyr Asp Ala Met Asp Tyr
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Pro Val Thr Gly Tyr Tyr Asp Ala Met Asp Tyr
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1 5 10

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<400> 61
Pro Val Asp Ala Tyr Tyr Asp Ala Met Asp Tyr
1 5 10

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1 5 10

<210> 63
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<400> 63
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1 5 10

<210> 64
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1 5 10 15
Ala

<210> 66
<211> 17
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<400> 66
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1 5 10 15
Ala

<210> 67
<211> 17
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<400> 67
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1 5 10 15
Ala

<210> 68

<211> 17
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<400> 68
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1 5 10 15
Ala

<210> 69
<211> 17
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1 5 10 15
Ala

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Ala

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Ala

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<211> 17

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1

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10

15

Ala

<210> 73

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<400> 73

Lys Ser Ser Gln Ser Leu Leu Asn Ser Arg Asn Gln Lys Asn Tyr Leu

1

5

10

15

Ala

<210> 74

<211> 17

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<400> 74

Lys Ser Ser Gln Ser Leu Leu Asn Ser His Asn Gln Lys Asn Tyr Leu

1

5

10

15

Ala

<210> 75

<211> 17

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<400> 75

Lys Ser Ser Gln Ser Leu Leu Asn Ser Ile Asn Gln Lys Asn Tyr Leu
1 5 10 15
Ala

<210> 76

<211> 17

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<400> 76

Lys Ser Ser Gln Ser Leu Leu Asn Ser Gly Asn Lys Lys Asn Tyr Leu
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<211> 9

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<400> 77

Gln Asn Asp His Gln Tyr Pro Tyr Thr
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<210> 78

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<400> 78

Gln Asn Asp His Gly Tyr Pro Tyr Thr
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<400> 79
Gln Asn Asp His Leu Tyr Pro Tyr Thr
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Gln Asn Asp His Ala Tyr Pro Tyr Thr
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Gln Asn Asp His Thr Tyr Pro Tyr Thr
1 5

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<400> 82
Gln Asn Asp His Val Tyr Pro Tyr Thr
1 5

<210> 83
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<400> 83
Gln Asn Asp His Ser Asn Pro Tyr Thr
1 5

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Gln Asn Asp His Ser Ser Pro Tyr Thr
1 5

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Gln Asn Asp His Ser Pro Pro Tyr Thr
1 5

<210> 86
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<400> 86
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1 5

<210> 87
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<400> 87
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<210> 88
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<400> 91
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1 5 10

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Pro Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Tyr
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<211> 13

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<400> 97

Gln Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Tyr
1 5 10

<210> 98

<211> 13

<212> PRT

<213> Artificial Sequence

<220>

<223> synthetic antibody mutation

<400> 98

Leu Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Tyr
1 5 10

<210> 99

<211> 13

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<220>

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<400> 99

Thr Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Tyr
1 5 10

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1 5 10

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1 5 10

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<400> 103
Arg Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Gln Asp Tyr
1 5 10

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<400> 104
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Arg Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Thr Asp Tyr
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<210> 106

<211> 13

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<400> 106

Arg Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Lys
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<210> 107

<211> 13

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<400> 107

Arg Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Thr
1 5 10

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Arg Ala Asn Tyr Gly Asn Pro Tyr Tyr Ala Met Asp Met
1 5 10

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<400> 110
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1 5 10 15

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<400> 111
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1 5 10 15

<210> 112
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<210> 113
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<400> 113

Arg Ser Ser Gln Ser Ile Val Ser Ser Asn Gly Asn Thr Tyr Leu Glu
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<210> 114

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<400> 114

Arg Ser Ser Gln Ser Ile Val His Trp Asn Gly Asn Thr Tyr Leu Glu
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<210> 115

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Arg Ser Ser Gln Ser Ile Val His Ser Tyr Gly Asn Thr Tyr Leu Glu
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<210> 116

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Arg Ser Ser Gln Ser Ile Val His Ser Trp Gly Asn Thr Tyr Leu Glu
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<211> 16

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<400> 117

Arg Ser Ser Gln Ser Ile Val His Ser Asn Gly Tyr Thr Tyr Leu Glu
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<211> 16

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Arg Ser Ser Gln Ser Ile Val His Ser Asn Gly Asn Thr Tyr Phe Glu
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<400> 119

Arg Ser Ser Gln Ser Ile Val His Ser Asn Gly Asn Thr Tyr Val Glu
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<400> 120

Ser Val Ser Asn Arg Phe Ser
1 5

<210> 121

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Lys Ala Ser Asn Arg Phe Ser
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<210> 122

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Lys Val Ser Ser Arg Phe Ser
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Lys Val Ser Asn Leu Phe Ser
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<210> 124

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Lys Val Ser Asn Arg Phe Trp
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<210> 125

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1 5

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1 5

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1 5

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<400> 156

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1 5 10 15
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<210> 157

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<400> 157

Lys Ser Ser Gln Ser Leu Leu Asn Trp Tyr Asn Gln Lys Asn Tyr Leu
1 5 10 15
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Lys Ser Ser Gln Ser Leu Leu Asn Tyr Tyr Asn Gln Lys Asn Tyr Leu
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1 5 10 15
Ala

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Ala

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Lys Ser Ser Gln Ser Leu Leu Asn Trp His Asn Gln Lys Asn Tyr Leu
1 5 10 15
Ala

<210> 162
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1 5 10 15
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57

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<222> 38, 39

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<222> 41, 42

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<222> 23, 24

<223> n = A,T,C or G

<400> 242

cgtgggttcct tgccccccagt amnnccatagc atcgtagtaa ccatcaaccg gtctcgcaca 60
gtaatacac 69

<210> 243

<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 20, 21
<223> n = A,T,C or G

<400> 243
cgtgggttcct tgcccccamn ngtcctatagc atcgtagtaa ccatcaaccg gtctcgcaca 60
gtaatacac 69

<210> 244
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 44, 45
<223> n = A,T,C or G

<400> 244
cttggtgccc tggccgaacg tccacggaac atgtgaacct tgmnnagcagt aataaaactcc 60
aacatc 66

<210> 245
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 41, 42
<223> n = A,T,C or G

<400> 245
cttggtgccc tggccgaacg tccacggaac atgtgaaccm nnaaagcagt aataaaactcc 60
aacatc 66

<210> 246
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 38, 39
<223> n = A,T,C or G

<400> 246
cttggtgccc tggccgaacg tccacggaac atgtgamnnt tgaaagcagt aataaactcc 60
aacatc 66

<210> 247
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 35, 36
<223> n = A,T,C or G

<400> 247
cttggtgccc tggccgaacg tccacggaac atgmnnacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 248
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 32, 33
<223> n = A,T,C or G

<400> 248
cttggtgccc tggccgaacg tccacggaac mnntgaacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 249
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 29, 30
<223> n = A,T,C or G

<400> 249
cttggtgccc tggccgaacg tccacggmn atgtgaacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 250
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 26, 27
<223> n = A,T,C or G

<400> 250
cttggtgccc tggccgaacg tccamnaac atgtgaacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 251
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 23, 24
<223> n = A,T,C or G

<400> 251
cttggtgccc tggccgaacg tmnncggaac atgtgaacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 252
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 20, 21
<223> n = A,T,C or G

<400> 252
cttggtgccc tggccgaamn nccacggaac atgtgaacct tgaaagcagt aataaactcc 60
aacatc 66

<210> 253
<211> 75
<212> DNA
<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 56, 57

<223> n = A,T,C or G

<400> 253

cgtggttcct tgccccagc agtccatagc atagtagggg ttaccatagt tagcmntcg 60
agcacagtaa tacgt 75

<210> 254

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 53, 54

<223> n = A,T,C or G

<400> 254

cgtggttcct tgccccagc agtccatagc atagtagggg ttaccatagt tmmntcttcg 60
agcacagtaa tacgt 75

<210> 255

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 50, 51

<223> n = A,T,C or G

<400> 255

cgtggttcct tgccccagc agtccatagc atagtagggg ttaccatamn nagctcttcg 60
agcacagtaa tacgt 75

<210> 256

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 47, 48

<223> n = A,T,C or G

<400> 256

cgtgggttcct tgccccccagt agtccatagc atagtagggg ttacccmngt tagctcttcg 60
agcacagtaa tacgt 75

<210> 257

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 44, 45

<223> n = A,T,C or G

<400> 257

cgtgggttcct tgccccccagt agtccatagc atagtagggg ttmnnatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 258

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 41, 42

<223> n = A,T,C or G

<400> 258

cgtgggttcct tgccccccagt agtccatagc atagtagggm nnaccatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 259

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 38, 39

<223> n = A,T,C or G

<400> 259

cgtgggttcct tgccccccagt agtccatagc atagtamng ttaccatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 260

<211> 75

<212> DNA

<213> Artificial Sequence

<220>
 <223> primer

 <221> misc_feature
 <222> 35, 36
 <223> n = A,T,C or G

 <400> 260
 cgtggttcct tgccccagc agtccatagc atamnnngggg ttaccatagt tagctcttcg 60
 agcacagtaa tacgt 75

 <210> 261
 <211> 75
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 32, 33
 <223> n = A,T,C or G

 <400> 261
 cgtggttcct tgccccagc agtccatagc mnnngtagggg ttaccatagt tagctcttcg 60
 agcacagtaa tacgt 75

 <210> 262
 <211> 75
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 29, 30
 <223> n = A,T,C or G

 <400> 262
 cgtggttcct tgccccagc agtccatmnn atagtagggg ttaccatagt tagctcttcg 60
 agcacagtaa tacgt 75

 <210> 263
 <211> 75
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 26, 27
 <223> n = A,T,C or G

<400> 263
cgtggttcct tgccccagc agtcmmnagc atagtagggg ttaccatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 264
<211> 75
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 23, 24
<223> n = A,T,C or G

<400> 264
cgtggttcct tgccccagc amnncatagc atagtagggg ttaccatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 265
<211> 75
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 20, 21
<223> n = A,T,C or G

<400> 265
cgtggttcct tgccccamn ngccatagc atagtagggg ttaccatagt tagctcttcg 60
agcacagtaa tacgt 75

<210> 266
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 41, 42
<223> n = A,T,C or G

<400> 266
gttcttttgg tttccgcwgt ttaacagact ctggctggam nngcagttga tgggtggccct 60

<210> 267
<211> 60

<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 38, 39
<223> n = A,T,C or G

<400> 267
gttctttttgg tttccgcwgt ttaacagact ctggctmnnn ttgcagttga tgggtggccct 60

<210> 268
<211> 60
<212> DNA
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<220>
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<221> misc_feature
<222> 35, 36
<223> n = A,T,C or G

<400> 268
gttctttttgg tttccgcwgt ttaacagact ctgmnnggac ttgcagttga tgggtggccct 60

<210> 269
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 32, 33
<223> n = A,T,C or G

<400> 269
gttctttttgg tttccgcwgt ttaacagact mnngctggac ttgcagttga tgggtggccct 60

<210> 270
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature

<222> 29, 30

<223> n = A,T,C or G

<400> 270

gttccttttgg tttccgcwgt ttaacagmnn ctggctggac ttgcagttga tggtaggcct 60

<210> 271

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 26, 27

<223> n = A,T,C or G

<400> 271

gttccttttgg tttccgcwgt ttaamnact ctggctggac ttgcagttga tggtaggcct 60

<210> 272

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 23, 24

<223> n = A,T,C or G

<400> 272

gttccttttgg tttccgcwgt tmnncagact ctggctggac ttgcagttga tggtaggcct 60

<210> 273

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 20, 21

<223> n = A,T,C or G

<400> 273

gttccttttgg tttccgcwmn ntaacagact ctggctggac ttgcagttga tggtaggcct 60

<210> 274
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 44, 45
<223> n = A,T,C or G

<400> 274
tggtttctgc tggtagcaag ctaagtagtt cttttgggtt ccmngttta acagactctg 60
gct 63

<210> 275
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 41, 42
<223> n = A,T,C or G

<400> 275
tggtttctgc tggtagcaag ctaagtagtt cttttgggtt nngcwgttta acagactctg 60
gct 63

<210> 276
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 38, 39
<223> n = A,T,C or G

<400> 276
tggtttctgc tggtagcaag ctaagtagtt cttttgmnt cgcwgttta acagactctg 60
gct 63

<210> 277
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
 <222> 35, 36
 <223> n = A,T,C or G

<400> 277
 tggtttctgc tggtagcaag ctaagtagtt cttmngttt ccgcwgttta acagactctg 60
 gct 63

<210> 278
 <211> 63
 <212> DNA
 <213> Artificial Sequence

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<221> misc_feature
 <222> 32, 33
 <223> n = A,T,C or G

<400> 278
 tggtttctgc tggtagcaag ctaagtagtt mnnttggttt ccgcwgttta acagactctg 60
 gct 63

<210> 279
 <211> 63
 <212> DNA
 <213> Artificial Sequence

<220>
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<221> misc_feature
 <222> 29, 30
 <223> n = A,T,C or G

<400> 279
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 gct 63

<210> 280
 <211> 63
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<221> misc_feature
 <222> 26, 27
 <223> n = A,T,C or G

<400> 280
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gct

63

<210> 281

<211> 63

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 23, 24

<223> n = A,T,C or G

<400> 281

tggtttctgc tggtaccaag cmnngtagtt cttttggttt ccgcwgttta acagactctg 60
gct 63

<210> 282

<211> 63

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 20, 21

<223> n = A,T,C or G

<400> 282

tggtttctgc tggtaccamn ntaagtagtt cttttggttt ccgcwgttta acagactctg 60
gct 63

<210> 283

<211> 57

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 38, 39

<223> n = A,T,C or G

<400> 283

gaatcgggtca gggacccccgg attccctggg agatgcmnng taaatgagca gcttagg 57

<210> 284

<211> 57

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 35, 36

<223> n = A,T,C or G

<400> 284

gaatcgggtca gggacccccg attccctggt agamnnccccg taaatgagca gcttagg 57

<210> 285

<211> 57

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 32, 33

<223> n = A,T,C or G

<400> 285

gaatcgggtca gggacccccg attccctggt mnntgccccg taaatgagca gcttagg 57

<210> 286

<211> 57

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 29, 30

<223> n = A,T,C or G

<400> 286

gaatcgggtca gggacccccg attccctmnn agatgccccg taaatgagca gcttagg 57

<210> 287

<211> 57

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 26, 27

<223> n = A,T,C or G

<400> 287

gaatcgggtca gggacccccg attcmnnggt agatgccccg taaatgagca gcttagg 57

<210> 288

<211> 57
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 23, 24
<223> n = A,T,C or G

<400> 288
gaatcgggtca gggacccccg amnncttggg agatgccccg taaatgagca gcttagg 57

<210> 289
<211> 57
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 20, 21
<223> n = A,T,C or G

<400> 289
gaatcgggtca gggaccccmn ntccctggg agatgccccg taaatgagca gcttagg 57

<210> 290
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 32, 33
<223> n = A,T,C or G

<400> 290
tggagcctgg cggacccagc tcaccaata mnactaaag gtgaatccag a 51

<210> 291
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 29, 30
<223> n = A,T,C or G

<400> 291
tggagcctgg cggacccagc tcatccamnn tctactaaag gtgaatccag a 51

<210> 292
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 26, 27
<223> n = A,T,C or G

<400> 292
tggagcctgg cggacccagc tcatmnnata tctactaaag gtgaatccag a 51

<210> 293
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 23, 24
<223> n = A,T,C or G

<400> 293
tggagcctgg cggacccagc tmnnccaata tctactaaag gtgaatccag a 51

<210> 294
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 20, 21
<223> n = A,T,C or G

<400> 294
tggagcctgg cggacccamnn catccaata tctactaaag gtgaatccag a 51

<210> 295
<211> 67
<212> DNA
<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 44, 45

<223> n = A,T,C or G

<400> 295

tagagatggc gtatagttta tcgtactgct atctggattt atmngccaa yccactccag 60
ccctttc 67

<210> 296

<211> 67

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 41, 42

<223> n = A,T,C or G

<400> 296

tagagatggc gtatagttta tcgtactgct atctggattm nnttcgccaa yccactccag 60
ccctttc 67

<210> 297

<211> 67

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 38, 39

<223> n = A,T,C or G

<400> 297

tagagatggc gtatagttta tcgtactgct atctggmmtt atttcgccaa yccactccag 60
ccctttc 67

<210> 298

<211> 67

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<221> misc_feature

<222> 35, 36

<223> n = A,T,C or G

<400> 298

tagagatggc gtatagttta tcgtactgct atcmnnattt atttcgcca yccactccag 60
ccctttc 67

<210> 299
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 32, 33
<223> n = A,T,C or G

<400> 299
tagagatggc gtatagttta tcgtactgct mnntggattt atttcgcca yccactccag 60
ccctttc 67

<210> 300
<211> 67
<212> DNA
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<220>
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<221> misc_feature
<222> 29, 30
<223> n = A,T,C or G

<400> 300
tagagatggc gtatagttta tcgtactmnn atctggattt atttcgcca yccactccag 60
ccctttc 67

<210> 301
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 26, 27
<223> n = A,T,C or G

<400> 301
tagagatggc gtatagttta tcgtmnnngct atctggattt atttcgcca yccactccag 60
ccctttc 67

<210> 302
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
 <223> primer

 <221> misc_feature
 <222> 23, 24
 <223> n = A,T,C or G

 <400> 302
 tagagatggc gtatagttta tmnactgct atctggattt atttcgcca yccactccag 60
 ccctttc 67

 <210> 303
 <211> 67
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 20, 21
 <223> n = A,T,C or G

 <400> 303
 tagagatggc gtatagttmn ncgtactgct atctggattt atttcgcca yccactccag 60
 ccctttc 67

 <210> 304
 <211> 67
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 48, 49
 <223> n = A,T,C or G

 <400> 304
 cgttgctctt ggagatgrtg aatytatcct ttagagatgg cgtatamnnt atcgtactgc 60
 tatctgg 67

 <210> 305
 <211> 67
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <221> misc_feature
 <222> 45, 46
 <223> n = A,T,C or G

<400> 305
cgttgtctct ggagatgrtg aatytatcct ttagagatgg cgtmnnngttt atcgactgc 60
tatctgg 67

<210> 306
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 42, 43
<223> n = A,T,C or G

<400> 306
cgttgtctct ggagatgrtg aatytatcct ttagagatgg mnnatagttt atcgactgc 60
tatctgg 67

<210> 307
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 39, 40
<223> n = A,T,C or G

<400> 307
cgttgtctct ggagatgrtg aatytatcct ttagagamnn cgtatagttt atcgactgc 60
tatctgg 67

<210> 308
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 36, 37
<223> n = A,T,C or G

<400> 308
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tatctgg 67

<210> 309
<211> 67

<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 33, 34
<223> n = A,T,C or G

<400> 309
cgttgtctct ggagatgrtg aatytatcct tmnnagatgg cgtatagttt atcgactgc 60
tatctgg 67

<210> 310
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 30, 31
<223> n = A,T,C or G

<400> 310
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tatctgg 67

<210> 311
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 27, 28
<223> n = A,T,C or G

<400> 311
cgttgtctct ggagatgrtg aatytmmnct ttagagatgg cgtatagttt atcgactgc 60
tatctgg 67

<210> 312
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature

<222> 41, 42
<223> n = A,T,C or G

<400> 312
ataggtgttt ccattactat gtacaatgct ctgactagam nngcaggaga tggaggcc 58

<210> 313
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 38, 39
<223> n = A,T,C or G

<400> 313
ataggtgttt ccattactat gtacaatgct ctgactmnnc ctgcaggaga tggaggcc 58

<210> 314
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> 35, 36
<223> n = A,T,C or G

<400> 314
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<210> 316
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<222> 29, 30

<223> n = A,T,C or G

<400> 316

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<210> 317

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<210> 318

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<223> n = A,T,C or G

<400> 318

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<210> 319

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<400> 319

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<210> 320
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<221> misc_feature
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<223> n = A,T,C or G

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<400> 321
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<210> 322
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<210> 323
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<400> 323

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<210> 324

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<210> 326

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<400> 358

Phe Gln Ser Ser His Phe Pro Trp Thr

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